

EARTHWORK SPECIFICATION  
MATERIALS, INSTALLATION, AND TESTING  
TENNECO GOLDSTRIKE PROJECT

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## I. TECHNICAL SPECIFICATIONS - EARTHWORK

### 1.0 GENERAL

#### 1.1 SCOPE

The earthwork contract described by these specifications is for the construction of three solution ponds, a D.E. pond, and a leach pad.

The following items are shown on the plans but are not a part of this contract:

- (1) Construction of the concrete walls and floors for the D E Pond.
- (2) Drainage gravel above the synthetic liners on the two pads.

#### 1.2 PROJECT LOCATION

The site is located in the old Bull Valley Mining District, 10 miles north of Gunlock, Utah. Access to the site will be by an unimproved county road.

#### 1.3 SITE CONDITIONS

The site has steep slopes and dry creek channels. Areas of the site where cut and fill is required will be as steep as 50% (2 horizontal to 1 vertical). The cut-fill material will vary from clay soil to competent bedrock. The cut-fill requirements specified herein, reflect this anticipated variation. Topsoil depths vary from zero to two feet, with an estimated twelve inches to be removed and stored for reclamation purposes. Vegetation is sparse, with juniper trees predominating.

#### 1.4 CONSTRUCTION SUPPORT

The owner will develop, prior to contract award, a flat staging area for construction equipment. This area is located one-half mile west of the construction site. A water line capable of supplying 150 gallons per minute of water will be available to the contractor at the staging area. Conveying water to the site for fill placement water will be the contractor's responsibility. Access roads from the staging area to the construction area will also be the contractor's responsibility. Location of the roads must be approved by the engineer. Electrical power, telephone, or toilet facilities will not be available for the contractor at the site.



## 1.5 SURVEYING

Surveying will be provided by the owner at no expense to the contractor.

## 2.0 CONTRACT ENTITIES AND DUTIES

### 2.1 THE OWNER

Tenneco Minerals, a Tenneco Company, responsible for contract award and contract payments who, through the designer's engineer, records job progress and specification compliance.

### 2.2 THE DESIGN ENGINEER

The firm of J.B.R. Consultants, who prepared the plans and specifications, or a designated design engineer who can, with the approval of the owner, make contract changes during construction.

### 2.3 THE ENGINEER

The design engineer's on-site engineer responsible for daily recording of job progress and testing to confirm specification compliance.

### 2.4 THE TESTING LABORATORY

A designated soils and material laboratory that will, at the request of the engineer, provide equipment for special testing.

### 2.5 THE EARTHWORK CONTRACTOR

The construction firm selected for the project responsible for performance of the earthwork work specified and to meet all contract legal requirements.

### 2.6 THE SUPERINTENDENT

The contractor's representative at the job site who has responsibility for orderly and timely performance of the work and is authorized to shut down the job on the written request of the engineer.



### 3.0 EARTHWORK

#### 3.1 SITE PREPARATION

##### 3.1.1 VEGETATION REMOVAL

The vegetation at the site consists of sparse juniper trees. The trees and major roots will be removed and burned on the site. Brush and grass will be stripped with the topsoil and stockpiled for site reclamation.

##### 3.1.2 TOPSOIL REMOVAL

The topsoil depth at the site varies from zero to in excess of two feet. The topsoil will be stripped and stockpiled at designated locations for reclamation. No sequence of stripping is required; therefore, stripping can be done at any time during the progress of the work.

#### 3.2 COMPACTED FILL

##### 3.2.1 CLAY LINER

The clay liner material will be fine grained soil with less than forty (40) percent gravel sized particles, having a maximum particle size of 4-inches, and when compacted to the specified density will have a permeability of  $2.0 \times 10^{-7}$  centimeters per second or less. The clay materials will be obtained from designated bank locations, or from stockpiles established by the contractor. The finished clay surface will meet the grade tolerances specified, and be smooth. The surface must be satisfactory for the placing of the HDPE liner.

The clay liner will be placed in six inch layers and compacted to a minimum dry density of 95 percent of the maximum dry density obtained by the Standard Proctor (ASTM D-698) Method of Compaction. The clay will be conditioned to a uniform moisture content plus or minus two percent of optimum prior to compaction. The engineer will check moisture and density and accept the fill as it is placed.

The engineer will assist the contractor in developing compactive effort requirements to meet the specifications should fill placement problems arise. The initial clay liner of the first solution pond will be used as a test fill. Nine field density tests will be run on the 60 feet by 60 feet area and three permeability tests. The permeability tests will be run at the maximum density obtained, the minimum density obtained, and the average density obtained. For the remaining fill placement, the field density will be used as a method of assessing the permeability compliance. The amount of testing after the test section has been evaluated, should be as follows:



- (1) Field density tests every 200 cubic yards
- (2) Thickness verification every 100 cubic yards
- (3) Gradation tests every 1,000 cubic yards

### 3.2.2 COMPACTED STRUCTURAL FILL

#### 3.2.2.1 QUANTITY OF FILL

Compacted structural fill material will be obtained from required cuts or from mine waste stockpiles. Both granular and fine grained soil will be acceptable.

The required thicknesses of compacted structural fill covering end-dumped materials are shown in the plans. These thicknesses are as follows:

- (1) Below the pads - 8'-6"
- (2) Below roads adjacent to the pads - 8'-6"
- (3) Below the solution ditch - 7'-0"
- (4) Below ponds and pond embankments to be all compacted fill or approved natural soil
- (5) Below the facility area - 10'-0"

#### 3.2.2.2 FINE GRAINED SOIL

Where fine grained soil is used for compacted fill the material will be placed in 12 inch maximum layers and compacted to 92 percent of the maximum dry density obtained by the Standard Proctor (ASTM D-698) Method of Compaction. The fine grained soil will be conditioned to a uniform moisture of plus or minus two percent of optimum prior to compaction. Under the direction of the engineer the testing laboratory personnel will check moisture and density and accept the fill as it is placed. The engineer will assist the contractor in developing compactive effort requirements to meet the specifications should fill placement problems arise. The fine grained soil will be conditioned to a uniform moisture of plus or minus two percent of optimum prior to compaction.

#### 3.2.2.3 GRANULAR SOIL

Where granular material is used for compactive fill the material will be placed in lifts of two feet maximum watered to near saturation and compacted by three passes of the spreading equipment, hauling equipment, or, approved compaction equipment.



### 3.3 END-DUMPED FILL

End-dumped fill material will be obtained from required cuts or from mine waste stockpiles. This fill may be placed by dumping from the top of an embankment or pushing with a dozer. No compaction standard or lift thicknesses are required.

### 3.4 APPROVED NATURAL SOILS

Approved natural soils are the in-place soil or bedrock material that will support the site structure without further required cut. The engineer will make this approval; however, all in-place materials below the topsoil at the site should be satisfactory.

### 3.5 CUT SECTIONS

#### 3.5.1 SLOPE REQUIREMENTS

The slope requirement for cut sections within the work area will be as shown on the plans. These slopes will be as follows:

- (1) Pond embankments (interior) - 3 horizontal to 1 vertical
- (2) Pond embankments (exterior) - 2 horizontal to 1 vertical
- (3) Beyond roads and pads - 1-1/2 horizontal to 1 vertical

The slopes may be steepened in areas of bedrock cut and flattened in areas of soft soils at the discretion of the engineer.

#### 3.5.2 GRADE TOLERANCE

The allowable variation to the grades shown on the plans will be as follows:

- (1) Below pond drainage system plus or minus - 0'-1"
- (2) Pond embankments plus or minus - 0'-6"
- (3) Solution ditch plus or minus - 0'-3"
- (4) Pads plus or minus - 1'-0"
- (5) Roads plus or minus - 1'-0"

#### 3.5.3 ROCK EXCAVATION

The excavation of competent bedrock in the required cut areas that requires blasting or heavy ripping for removal will be classified as rock excavation. The cut areas that classify as rock excavation will be determined jointly by the engineer and the superintendent.



### 3.6 FILL SECTIONS

#### 3.6.1 SLOPE REQUIREMENTS

The slope requirements of fill sections within the work area will be as shown on the plans. These slopes will be as follows:

- (1) Inside pond embankments - 3 horizontal to 1 vertical
- (2) Between ponds and west of leach pad - 2 horizontal to 1 vertical
- (3) All other slopes - 1-1/2 horizontal to 1 vertical

#### 3.6.2 GRADE TOLERANCE

The allowable variation to the grades for fill sections will be identical to those described for cut sections.

### 3.7 LEAK DETECTION SYSTEMS

#### 3.7.1 SOLUTION PONDS

A leak detection system will be installed in the pregnant pond, the barren pond, and the water pond. The sump and the detection pipe will be installed by the earthwork contractors. Details are shown on the drawings. The following items are included:

- (1) A five foot square sump
- (2) Coarse aggregate wrapped in filter fabric
- (3) A 1-1/2 inch HDPE leak detection pipe
- (4) A well screen section to collect leakage
- (5) Standpipe for effluent sampling

The geo-fabric drainage portion of the system will be installed by the synthetic liner contractor.

#### 3.7.2 LEACH PAD

A leak detection system will be installed below the leach pad. Details are shown on the drawings. The following items are included:

- (1) A six inch gravel drain below the entire pad area
- (2) Eight leak detection lines that include:
  - (a) A four inch HDPE collection line
  - (b) A one and one-half inch monitoring line



- (3) A six inch of compacted clay below the gravel drain
- (4) A compacted clay barrier to direct leakage into the collection line

Connecting the monitoring lines to the ditch liner will be done by the synthetic liner contractor.

The thickness of the leak detection gravel will be verified by the engineer on 100-foot centers throughout the pad area.

### 3.8 CONCRETE

Concrete for the D E Pond, the entrance structure, and the exit structures shall be mixed at the site in truck or stationary mixers. The concrete shall be designed for a strength of 3000 p.s.i. Reinforcement for the D E Pond is shown on Drawing 8 of 8. Reinforcement is not required for the entrance or exit structures.

### 3.8 CONTRACTOR REQUIREMENTS

#### 3.8.1 CONTRACTOR'S EQUIPMENT

The contractor's equipment shall be in good working condition and well maintained while at the job site. The contractor must have sufficient equipment to excavate and move 8,000 cubic yards of material per day. Of this total 3,000 cubic yards per day will be compacted fill which will be conditioned and compacted as specified.

#### 3.8.2 CONTRACTOR'S SUPERINTENDENT

The contractor shall provide a job superintendent acceptable to the owner and the engineer. The superintendent shall have the authority to shut down the work if the specifications are not being met.